

WHAT IS CLAIMED IS:

1. A process for producing ethanol from organic materials comprising the steps of:

- 5 providing an aqueous solution containing organic materials;
 contacting said aqueous solution with a gas comprising
ozone, said ozone being present in an amount sufficient to oxidize and
break down at least a portion of said organic materials into a oxidized
medium;
 contacting said oxidized medium with microorganisms, said
10 microorganisms consuming said oxidized medium in a cellular process to
produce ethanol as a byproduct of said process; and
 collecting said ethanol.

2. A process as defined in claim 1, wherein said organic materials
comprise a material selected from the group consisting of a
15 lignocellulosic material, a proteinaceous material, a carbohydrate, a
chitin, and mixtures thereof.

3. A process as defined in claim 1, wherein said organic materials
comprise animal waste.

4. A process as defined in claim 1, wherein said aqueous solution
20 comprises a waste water.

5. A process as defined in claim 1, further comprising the step of
reducing the size of said organic materials.

6. A process as defined in claim 1, wherein said ozone is
contacted with said aqueous solution at a concentration of at least 0.01
25 ppm.

7. A process as defined in claim 1, wherein said aqueous solution
is contacted with said ozone by flowing said aqueous solution through a
venturi and feeding said ozone into said venturi.

8. A process as defined in claim 1, further comprising the steps of placing solid waste materials containing said organic materials into a porous container and circulating water through said porous container in order to form said aqueous solution.

5 9. A process as defined in claim 1, wherein said aqueous solution is contained in a slurry that is fed through an auger, said ozone being fed to said auger.

10 10. A process as defined in claim 1, wherein a pH modifier is added to said aqueous solution in order to adjust the pH of said solution.

11. A process as defined in claim 1, further comprising the step of separating out any solid materials contained in said solution prior to contacting said solution with said microorganisms.

12. A process as defined in claim 1, wherein said ozonated aqueous solution is contacted with said microorganisms in a packed tower.

13. A process as defined in claim 1, further comprising the step of separating said produced ethanol from said aqueous solution, said ethanol being separated from said aqueous solution through distillation.

14. A process as defined in claim 1, wherein said aqueous solution is cooled during contact with said ozone.

15. A process as defined in claim 14, further comprising the step of heating said solution after said solution is cooled.

16. A process as defined in claim 1, further comprising the step of converting said ethanol to a hydrocarbon gas by contacting said ethanol with a second microorganism.

17. A process as defined in claim 1, wherein said cellular process comprises respiration or photosynthesis.

18. A process as defined in claim 1, wherein said cellular process comprises fermentation.

19. A process as defined in claim 1, wherein said microorganism comprises an organism selected from the group consisting of Zymomonas mobilis, Saccharomyces cerevisiae, and mixtures thereof.

20. A process for producing useful products from organic materials comprising the steps of:

5 providing an aqueous solution containing organic materials;

contacting said aqueous solution with a gas comprising ozone, said ozone being contacted with said aqueous solution at a concentration of at least 0.01 ppm., said ozone being present in an

10 amount sufficient to oxidize at least a portion of said organic materials into an oxidized medium;

contacting said ozonated aqueous solution with a material selected from the group consisting of an organism, an enzyme, and mixtures thereof for converting said oxidized medium into a metabolic

15 product; and

collecting said product.

21. A process as defined in claim 20 wherein said product comprises an alcohol.

22. A process as defined in claim 20, wherein said product

20 comprises organic acid.

23. A process as defined in claim 20, wherein said product comprises a vitamin.

24. A process as defined in claim 20, wherein said aqueous solution is contacted with said ozone by flowing said aqueous solution

25 through a venturi and feeding said ozone into said venturi.

25. A process as defined in claim 20, wherein said ozonated aqueous solution is contacted with a plant and wherein said metabolic product comprises a pigment.

26. A process as defined in claim 25, wherein said plant comprises red algae.

27. A process as defined in claim 20, wherein said ozonated aqueous solution is contacted with a bacteria and wherein said metabolic
5 product comprises a hydrocarbon gas.

28. A process as defined in claim 27, wherein said hydrocarbon gas comprises methane.

29. A process as defined in claim 27, wherein said bacteria comprises a bacteria chosen from the group of methanogenic bacteria
10 and wherein said hydrocarbon gas comprises methane.

30. A process as defined in claim 21, further comprising the steps of:

contacting said alcohol with an organism for converting said alcohol into a hydrocarbon gas; and

15 collecting said hydrocarbon gas.

31. A process as defined in claim 30, wherein said hydrocarbon gas contains methane.

32. A process as defined in claim 31, wherein said ozonated aqueous solution is contacted with a material selected from the group
20 consisting of a plant, a microorganism, and mixtures thereof to produce said alcohol, and wherein said microorganism used to produce said methane comprises a bacteria selected from the group of methanogenic bacteria.

33. A process as defined in claim 20, wherein said organic
25 materials comprise food industry waste.

34. A process as defined in claim 20, wherein said organic materials comprise animal waste.

35. A process as defined in claim 20, wherein said organic materials comprise paper industry waste.

36. A process as defined in claim 20, wherein said organic materials comprise petroleum refining waste.

37. A process as defined in claim 20, wherein said organic materials comprise tire waste.

5 38. A process as defined in claim 20, wherein said organic materials comprise municipal solid waste.

39. A process as defined in claim 20, wherein said product comprises a material selected from the group consisting of aldehydes, ketones, alkanes, alkenes, alkynes, lipids, peroxides, and pigments.

10 40. A process as defined in claim 20, wherein said product comprises a beta glucan.

41. A process as defined in claim 20, wherein said product comprises polyhydroxybutyrate, polyhydroxyvalerate, or mixtures thereof.

15 42. A process as defined in claim 20, further comprising the step of feeding said ozonated aqueous solution to a plant system.

43. A process as defined in claim 42, wherein said aqueous solution is fed to said plant system after said product is separated from the aqueous solution.

20 44. A process for producing methane from waste materials comprising of steps of:

providing an aqueous solution containing organic compounds;

25 contacting said aqueous solution with a gas comprising ozone, said ozone being present in an amount sufficient to convert at least a portion of said organic compounds into an oxidized medium;

contacting said ozonated aqueous solution with microorganisms, said microorganisms converting said oxidized medium into methane; and

collecting said methane.

45. A process as defined in claim 44, wherein said aqueous solution is contacted with said ozone by flowing said aqueous solution through a venturi and feeding said ozone into said venturi.

46. A process as defined in claim 44, further comprising the steps
5 of:

monitoring the amount of metabolizable substrates in said aqueous solution during ozonation; and

ozonating said aqueous solution until the amount of said metabolizable substrates detected begins to decrease.

10 47. A process as defined in claim 44, further comprising the steps of:

calculating a maximum amount of metabolizable substrates that may be produced during ozonation of said aqueous solution based upon the amount and type of organic compounds contained in said solid
15 waste materials; and

contacting said aqueous solution with ozone in an amount sufficient to produce at least said calculated maximum amount.

48. A process as defined in claim 46, wherein said metabolizable substrates comprise sugars.

20 49. A process for producing a useful product from waste materials comprising the steps of:

providing an aqueous solution containing organic materials;
contacting said aqueous solution with a gas comprising ozone, said ozone being present in an amount sufficient to oxidize and
25 break down at least a portion of said organic materials into an oxidized medium;

drying and collecting said oxidized medium.

50. A process as defined in claim 49, wherein said oxidized medium comprises a fertilizer.

51. A process as defined in claim 49, further comprising the step of removing inorganic solid materials from said aqueous solution prior to collecting said oxidized medium.